

# PATENT ABSTRACTS OF JAPAN

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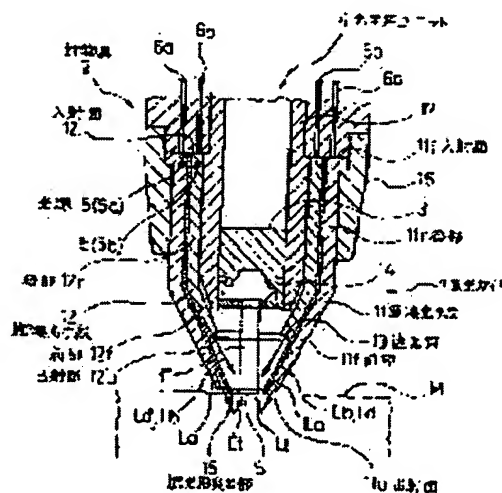
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## (54) TRANSMITTED LIGHT AND DOWNWARD LIGHT SELECTION TYPE LIGHT CONVERGING GUIDE

### (57)Abstract:

**PURPOSE:** To selectively use transmitted light and downward light and select the both more clearly as to the light converging guide for irradiation light convergence which is fitted atop of the object tool of a magnifying observation device and used.

**CONSTITUTION:** The transmitted light Lt and downward light Ld are selectively used by employing the double structure of a 1st light converging means 11 that has a projection surface 11u which can abut on and approach an observation position and a 2nd light converging means 12 that is provided while inscribed in the 1st light converging means and has its projection surface 12u positioned behind the projection surface 11u; and a light shield cylinder 13 is interposed between the 1st and 2nd light converging means and the tip of this light shield cylinder is projected as a light shielding projection part 15 from the projection surface 11u to purify the respective irradiation light beams.



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## Mechanical Translation

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
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## CLAIMS

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[Claim(s)]

[Claim 1] In the condensing guide which is connected to the point of the object implement equipped with the light source for illuminating the optical system and the observation part for expanding the image of an observation object, is made to condense the illumination light from the light source, and irradiates an observation part The light which has passed through the tubed posterior part which has the annular plane of incidence which counters the annular light source in a end face, and the interior of a solid of this posterior part The point so that it may lead to the outgoing radiation side at the tip which is a bigger path smaller than the path of plane of incidence and than the visual field of optical system and which was formed annularly A 1st condensing means to have the anterior part which narrowed and was formed in the configuration, The condensing guide of the transmitted light-overhead light case index characterized by consisting of the 2nd condensing means combined with the 1st condensing means by the inscribed condition as it has the almost same structure as the 1st condensing means and the outgoing radiation side was located more back than the outgoing radiation side of the 1st condensing means.

[Claim 2] The condensing guide of a transmitted light-overhead light case index according to claim 1 with which it changes into a inscribed condition and the protection-from-light cylinder is prepared in the medial surface of the 1st condensing means.

[Claim 3] The condensing guide of a transmitted light-overhead light case index according to claim 2 with which the tip of a protection-from-light cylinder is made to project as a lobe for protection from light from the outgoing radiation side of the 1st condensing means.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the expansion observation equipment for

expanding and observing various kinds of observation objects, for example, people's skin, in the condition as it is, without performing any processing, and relates to the condensing guide connected and used especially for it about that object implement.

[0002]

[Description of the Prior Art] The observation equipment expanded and observed, without performing any processing in a location [ that there has been it about an observation object ] It consists of a body of observation equipment which reproduces and observes on a display the image caught with the object implement and this object implement for catching the image of an observation object. That object implement It has the condensing guide for condensing the illumination light from the light source to the light source for illuminating the optical system for expanding the image of an observation object, the image sensor in which image formation is carried out by this optical system and which catches an image, and an observation part, and it, and irradiating an observation object etc.

[0003] Such observation equipment can perform observation which can be said to be observation of a stand free-lancer so to speak to the observation under the conventional microscope which needs the sample which processed the predetermined condition, and observation of this stand free-lancer has the large degree of freedom of the observation technique, and can expect breadth with the observation purpose more and more from now on. And in connection with the big breadth such for the purpose of observation, various demands will be imposed also about control of the exposure light for illuminating the observation part of an observation object.

[0004] There is the transmitted light which reflects inside in the case of an observation object of translucency like the skin of the overhead light which illuminates an observation side from a top, side \*\*\*\* irradiated by the acute angle near in parallel to an observation side, and a man, and compares an observation part with it from the inside once penetrating inside in the exposure light which generally illuminates an observation object. And there is a property of a proper in each [ these ] exposure light, respectively, and it becomes observable according to each of this property. Therefore, in order to make the observation purpose demanded suit more, side \*\*\*\* will be made into a subject or selection of each light which uses only the transmitted light also except for side \*\*\*\* except for an overhead light will be required.

[0005] About the object implement thru/or the condensing guide which enables selection of exposure light from such a viewpoint, this applicant has already made some proposals. For example, they are Japanese Patent Application No. No. 201384 [ two to ], Japanese Patent Application No. No. 302507 [ two to ], Japanese Patent Application No. No. 38967 [ three to ], or Japanese Patent Application No. No. 38968 [ three to ]. Each of these uses the condensing guide which is made to condense the illumination light from the light source, and irradiates an observation part, and enables it to perform characteristic exposure light selection by giving various devices to this condensing guide. For example, when Japanese Patent Application No. No. 38967 [ three to ] makes a condensing guide a duplex type, it enables it to perform the positive activity of an overhead light, and Japanese Patent Application No. No. 38968 [ three

to ] enables it to choose arbitration about side \*\*\*\*, an overhead light, and the transmitted light by making a condensing guide into a multiplex type.

[0006]

[Problem(s) to be Solved by the Invention] By the way, although said each technique has a property according to each structure, satisfaction sufficient not necessarily always is not given to various demands. For example, it is the example when clearer separation of both light is required about selection with an overhead light and the transmitted light. So, it aims at offer of the condensing guide which can choose an overhead light and the transmitted light more efficiently and purely in this invention.

[0007]

[Means for Solving the Problem and its Function] For such a purpose, the condensing guide by this invention The light which has passed through the tubed posterior part which has the annular plane of incidence which counters the annular light source in a end face, and the interior of a solid of this posterior part The point so that it may lead to the outgoing radiation side at the tip which is a bigger path smaller than the path of plane of incidence and than the visual field of optical system and which was formed annularly A 1st condensing means to have the anterior part which narrowed and was formed in the configuration, It has the almost same structure as the 1st condensing means, and is formed from the 2nd condensing means combined with the 1st condensing means by the inscribed condition from the outgoing radiation side of the 1st condensing means as the outgoing radiation side was located back.

[0008] The transmitted light is obtained by the 1st condensing means, and an overhead light is acquired by the 2nd condensing means, alternative use of the transmitted light and an overhead light is possible for this condensing guide, and the combination use of equipment of both light is also still more possible for it if needed. Namely, this condensing guide is the thing which the outgoing radiation side of the 1st condensing means changes into contiguity thru/or the condition of touching and by which it is used for the front face of an observation object. The exposure light which came out from the outgoing radiation side of contiguity thru/or the 1st condensing means which touched to the front face of this observation object Once penetrating inside the surface of an observation object from the perimeter of an observation part, without irradiating directly, the visual field, i.e., the observation part, of optical system, Becoming the transmitted light which is reflected inside this surface and illuminates an observation part from the inside, the direct incident light of the exposure light which came out from the outgoing radiation side of the means 2nd condensing [ of another side ] is carried out to the front face of an observation part, and it turns into an overhead light. Therefore, by changing the existence of the incident light from the light source to each 1st and 2nd condensing means, and the ratio of the quantity of light, the transmitted light or an overhead light can be chosen as arbitration, or both light can be combined by the proper ratio.

[0009] About such a condensing guide, if it changes into a inscribed condition and a protection-from-light cylinder is prepared in the medial surface of the 1st condensing means, interference between the 1st and 2nd means condensing [ both ] can be prevented, and purer

alternative use of each exposure light can be realized.

[0010] Moreover, if it is made to make the tip of a protection-from-light cylinder project as a lobe for protection from light from the outgoing radiation side of the 1st condensing means, much more purification of exposure light which carries out selection use will be obtained. That is, in the front face of an observation object, if it is the case of the transmitted light, if it is the case of an overhead light again, exposure light tends to leak from an observation part to an observation part side to that perimeter side, but since this exposure light that is going to leak can be shaded by the lobe for protection from light, said purification will be obtained from the perimeter of an observation part.

[0011]

[Example] Hereafter, the example of this invention is explained. It is the object implement 2 using the condensing guide 1 of the transmitted light-overhead light case index by this invention which is shown in drawing 3. This object implement 2 While building in the optical-system unit 4 containing the objective lens 3 as it presupposed that it is cylindrical as a whole and shown in the interior at drawing 1, and the image pick-up system unit which is not illustrated The light source 5 mentioned later is built in, the image of the observation object expanded in the optical-system unit is caught in an image pick-up system unit including an image pick-up means like for example, a CCD component, on the body of observation equipment outside drawing, it reproduces on delivery and its display and this is observed.

[0012] Many optical fibers 6 and 6 and .... make the light source 5 equivalent to the structure of the below-mentioned condensing guide 1 in this example by arranging an exposure edge in the shape of a circular ring, and being formed, and he is trying to consist of two rings of the light sources 5a and 5b, as shown in drawing 2. And the connector area 9 of the optical fibers 6a and 6a of the light sources 5a and 5b, ..., the optical fiber bundle 8 that draws light from the source of luminescence outside drawing to both these connector areas 7a and 7b can be alternatively connected now by bundling 6b, 6b, and .. by the back end, respectively, and forming connector areas 7a and 7b.

[0013] The condensing guide 1 consists of the 1st condensing means 11, the 2nd condensing means 12, and a protection-from-light cylinder 13, as shown in drawing 1. The 1st condensing means 11 is built with a transparent material like acrylic resin, and consists of posterior part 11r and 11f of anterior part. Posterior part 11r has become cylinder-like mostly, and the duty to which the end face side of the shape of that circular ring carries out the light guide of the illumination light from light source 5a which it was set to plane-of-incidence 11i, and carried out incidence to this plane-of-incidence 11i to 11f of anterior part is in negative.

[0014] as [ carry out / at an angle of predetermined / which is later mentioned from this outgoing radiation side 11u / on the other hand, / 11f of anterior part has at the tip outgoing radiation side 11u of the shape of a circular ring made into the bigger path than the visual field of an objective lens 3, and the visual field F which specifically extracts and is given by 14, and / anterior part / outgoing radiation of the exposure light La ] .. it narrows the point and is formed in the configuration. That is, it narrows the point, and it is the configuration which it is

efficient, is made to carry out total reflection of this saying [ configuration ] inside a solid, without leaking the exposure light La of posterior part 11r outside as much as possible, and can carry out a light guide to outgoing radiation side 11u, and the cone configuration is used in this example.

[0015] Although the 2nd condensing means 12 is established so that it may be inscribed in the 1st condensing means 11 on both sides of the protection-from-light cylinder 13, and it has posterior part 12r of the same structure as the 1st condensing means 11, and 12f of anterior part and it considers as the configuration [ \*\*\*\* / the 1st condensing means 11 ], the die length of 12f of anterior part is merely made shorter than 11f of anterior part of the 1st condensing means 11.

[0016] The protection-from-light cylinder 13 is formed in the thin barrel [ \*\*\*\* / the inside configuration of the 1st condensing means 11 ] using the material of non-transparency like aluminum. And you change this protection-from-light cylinder 13 into the condition that that tip projects from outgoing radiation side 11u of the 1st condensing means 11 slightly, and serves as the lobe 15 for protection from light, and it is made it to be inscribed in the 1st condensing means 11. In addition, 16 in drawing is a connection holder for connecting the condensing guide 1 to the object implement 2, and 17 is a lens holder.

[0017] The tip of the protection-from-light cylinder 13 is used by changing into the condition of touching the front face of the observation object M, and the focus of optical system suits the observation object M of this condensing guide 1 in this condition. Moreover, in this condition, outgoing radiation side 11u of the 1st condensing means 11 will be in a contiguity condition which touches the front face of the observation object M mostly. Therefore, the exposure light La which carried out outgoing radiation from outgoing radiation side 11u turns into the transmitted light Lt which once penetrates inside the surface of the observation object M from the perimeter of the observation part S, without irradiating directly, the visual field S, i.e., the observation part, of an objective lens 3, and is reflected inside the surface of the observation object M, and illuminates the observation part S from the inside.

[0018] Here, the aforementioned predetermined include angle is the incident angle which can reach the observation part S as the transmitted light Lt reflected after the exposure light La penetrated inside the surface of the observation object M from the perimeter of the observation part S.

[0019] On the other hand, since 12f of the anterior part is shorter than 11f of anterior part of the 1st condensing means 11 in the case of the 2nd condensing means 12, the outgoing radiation side 12u is fully distant from the front face of the observation object M. Therefore, outgoing radiation is carried out from the outgoing radiation side 12u, and the exposure light Lb turns into the overhead light Ld which carries out a direct incident light to the observation part S of the observation object M. Therefore, by changing the existence of the incident light from the light sources 5a and 5b to each 1st and 2nd condensing means 11 and 12, and the ratio of the quantity of light, the transmitted light or an overhead light can be chosen as arbitration, or both light can be combined by the proper ratio.

[0020] The following duties of the protection-from-light cylinder 13 are in negative to the exposure light optional feature of each such 1st and 2nd condensing means 11 and 12. Each of one is making purer transmitted light lighting and each overhead light lighting by separating optically completely the 1st and 2nd means 11 and 12 condensing [ both ] currently made from the transparent body, and preventing that the light of one condensing means goes into the condensing means of another side. Moreover, other one is attaining purification of transmitted light lighting and each overhead light lighting by preventing the leakage of the exposure light in the front face of the observation object M. That is, in the front face of the observation object M, although it is going to leak from the observation part S to that perimeter side from the perimeter of the observation part S to the observation part S side, respectively if it is the case of an overhead light Ld again if it is the case of the transmitted light Lt, this leakage is prevented by that lobe 14.

[0021] being shown in drawing 4 -- other examples -- it is -- the condensing guide 20 of this example -- the 1st condensing means 21 and the 2nd condensing means 22 -- each anterior part 21f and 22f is formed in the shape of a spherical-surface object. The shape of such a spherical-surface bodily shape is superior to the cone configuration in said example in respect of the efficiency of a light guide. On the other hand, to needing the fabrication which uses a die for the manufacture in the case of-like [ spherical-surface bodily-shape ], cutting is possible for a cone configuration and it has the advantage in which workability is good. In addition, in addition to this, the sign of correspondence is given to the condensing guide 1 of said example, and a corresponding part, and the explanation is omitted.

[0022] Although the 1st condensing means and the 2nd condensing means were mostly formed in the similarity configuration in the above example, the 2nd condensing means does not necessarily need to be similarity to the 1st condensing means. I hear that the exposure light irradiated from the outgoing radiation side of the 2nd condensing means established inside the 1st condensing means in short should just come to carry out an incident light to an observation part efficiently, and it is in it.

[0023]

[Effect of the Invention] Since it becomes combining the 1st condensing means and the 2nd condensing means, and the transmitted light is obtained by the 1st condensing means and an overhead light is acquired by the 2nd condensing means as explained above, the condensing guide by this invention can use these alternatively, and the more nearly many-sided observation of it is attained. Moreover, by having prepared the protection-from-light cylinder, each of the transmitted light and an overhead light is made to a purer thing, and the fruit of alternative use of exposure light can be raised.





## 【特許請求の範囲】

【請求項 1】 観察物の像を拡大するための光学系及び観察部位を照明するための光源を備えた対物具の先端部に接続され、光源からの照明光を集光させて観察部位に照射する集光ガイドにおいて、

環状の光源に対向する環状の入射面を基端に有する筒状の後部、及びこの後部の中実内部を通過して来た光を、入射面の径より小さく且つ光学系の視野より大きな径である環状に形成された先端の出射面に導くように先窄まり形状に形成された前部を有する第 1 集光手段と、

第 1 集光手段とほぼ同様の構造を有し、第 1 集光手段の出射面より後方にその出射面が位置するようにして第 1 集光手段に内接状態に組み合わせられた第 2 集光手段とよりなることを特徴とする透過光－落射光選択式の集光ガイド。

【請求項 2】 第 1 集光手段の内側面に内接状態にして遮光筒が設けられている請求項 1 に記載の透過光－落射光選択式の集光ガイド。

【請求項 3】 遮光筒の先端が第 1 集光手段の出射面より遮光用突出部として突出させられている請求項 2 に記載の透過光－落射光選択式の集光ガイド。

## 【発明の詳細な説明】

### 【0001】

【産業上の利用分野】この発明は、各種の観察物、例えば人の皮膚を何らの加工を施すことなくそのままの状態に拡大して観察するための拡大観察装置に係るもので、その対物具に関し、特にそれに接続して用いられる集光ガイドに関する。

### 【0002】

【従来の技術】観察物をそれがああるままの位置で何らの加工を施すことなく拡大して観察する観察装置は、観察物の像を捉えるための対物具と、この対物具で捉えられた像をディスプレイに再生して観察する観察装置本体とよりなっており、その対物具は、観察物の像を拡大するための光学系、この光学系により結像されて像を捉える撮像素子、観察部位を照明するための光源、それに光源からの照明光を集光して観察物に照射するための集光ガイド等を備えている。

【0003】このような観察装置は、所定の状態に加工した試料を必要とする従来の顕微鏡による観察に対し言わばスタンドフリーの観察と言える観察を行なえるもので、このスタンドフリーの観察は、観察手法の自由度が大きく、観察目的の今後ますますの広がりを期待できる。そして、このような観察目的の大きな広がりに伴い、観察物の観察部位を照明するための照射光の制御についても種々の要求が課されることになる。

【0004】一般に観察物を照明する照射光には、観察面を上から照らす落射光と、観察面に対し平行に近い急角度で照射する側射光と、及び例えば人の皮膚のような透光性の観察物の場合に、内部に一旦透過した後、内部

で反射して観察部位を内側から照らす透過光とがある。そして、これら各照射光にはそれぞれ固有の特性があり、このそれぞれの特性に応じた観察が可能となる。したがって、要求される観察目的に、より適合させるために、落射光を除いて側射光を主体にしたり、あるいは側射光をも除いて透過光だけを用いるような各光の選択が要求されることになる。

【0005】このような観点から照射光の選択を可能とする対物具乃至集光ガイドについて、当出願人は既に幾つかの提案をしている。例えば、特願平 2-201384 号、特願平 2-302507 号、特願平 3-38967 号、あるいは特願平 3-38968 号等である。これらは何れも光源からの照明光を集光させて観察部位に照射する集光ガイドを用いており、この集光ガイドに種々の工夫を施すことにより、特有の照射光選択を行なえるようにしている。例えば、特願平 3-38967 号は、集光ガイドを二重式とすることにより、落射光の積極的な活用を行なえるようにし、また特願平 3-38968 号は、集光ガイドを多重式とすることにより、側射光、落射光、及び透過光について任意の選択を行なえるようにしている。

### 【0006】

【発明が解決しようとする課題】ところで、前記各技術はそれぞれの構造に応じた特性を持っているが、種々の要求に対し必ずしも常に十分な満足を与えるものでない。例えば、落射光と透過光との選択について両光のより明瞭な分離が要求される場合はその例である。そこで、この発明では、落射光と透過光をより効率よく、また純粋に選択できる集光ガイドの提供を目的とする。

### 【0007】

【課題を解決するための手段及び作用】このような目的のために、この発明による集光ガイドは、環状の光源に対向する環状の入射面を基端に有する筒状の後部、及びこの後部の中実内部を通過して来た光を、入射面の径より小さく且つ光学系の視野より大きな径である環状に形成された先端の出射面に導くように先窄まり形状に形成された前部を有する第 1 集光手段と、第 1 集光手段とほぼ同様の構造を有し、第 1 集光手段の出射面より後方にその出射面が位置するようにして第 1 集光手段に内接状態に組み合わせられた第 2 集光手段とより形成されている。

【0008】この集光ガイドは、第 1 集光手段により透過光が得られ、また第 2 集光手段により落射光が得られるもので、透過光と落射光の選択的使用が可能であり、さらに必要に応じて両光の組合せ使用も可能である。すなわち、この集光ガイドは、第 1 集光手段の出射面が観察物の表面に近接乃至接する状態にして用いられるもので、この観察物の表面に近接乃至接した第 1 集光手段の出射面から出た照射光は、光学系の視野、つまり観察部位には直接照射されることなく観察部位の周囲から観察

物の表層内部に一旦透過した後、この表層内部で反射されて観察部位を内側から照らす透過光となり、他方第2集光手段の出射面から出た照射光は、観察部位の表面に対し直接落射して落射光となる。したがって、第1、第2の各集光手段への光源からの入射光の有無やその光量の比率を変えることにより、任意に透過光または落射光を選択でき、あるいは両光を適宜な比率で組み合わせることができる。

【0009】このような集光ガイドについては、第1集光手段の内側面に内接状態にして遮光筒を設けるようにすれば、第1、第2の両集光手段の間における干渉を防止でき、各照射光のより純粋な選択的使用を実現できる。

【0010】また、遮光筒の先端を第1集光手段の出射面より遮光用突出部として突出させるようにすれば、選択使用する照射光のより一層の純化が得られる。すなわち、観察物の表面においては、透過光の場合であれば観察部位の周囲から観察部位側へ、また落射光の場合であれば観察部位からその周囲側へ照射光が漏れようとするが、この漏れようとする照射光を遮光用突出部で遮光することができるので、前記純化が得られるものである。

【0011】

【実施例】以下、この発明の実施例を説明する。図3に示すのは、この発明による透過光・落射光選択式の集光ガイド1を用いた対物具2で、この対物具2は、全体として円筒状とされ、その内部に図1に示すような対物レンズ3を含む光学系ユニット4や図示せぬ撮像系ユニットを内蔵すると共に、後述する光源5を内蔵しており、光学系ユニットで拡大した観察物の像を例えばCCD素子のような撮像手段を含む撮像系ユニットで捉え、これを図外の観察装置本体に送り、そのディスプレイに再生して観察するようになっている。

【0012】光源5は、図2に示すように、多数の光ファイバ6、6、……の照射端を円環状に配列して形成されるもので、この例では、後述の集光ガイド1の構造に対応させて光源5a、5bの2環からなるようにされている。そして、光源5a、5bの光ファイバ6a、6a、……、6b、6b、……は、それぞれ後端で束ねられてコネクタ部7a、7bが形成されており、この両コネクタ部7a、7bに対し、図外の発光源から光を導く光ファイバ束8のコネクタ部9を選択的に接続できるようになっている。

【0013】集光ガイド1は、図1に示すように、第1集光手段11、第2集光手段12、及び遮光筒13からなっている。第1集光手段11は、例えばアクリル樹脂のような透明な素材でつくられるもので、後部11rと前部11fよりなっている。後部11rは、ほぼ円筒状になっており、その円環状の基端面が入射面11iとされ、この入射面11iに入射した光源5aからの照明光を前部11fへ導光する役目を負っている。

【0014】他方、前部11fは、先端に対物レンズ3の視野、具体的には絞り14で与えられる視野Fより大きな径とされた円環状の出射面11uを有しており、この出射面11uから後述する所定の角度で照射光Laを出射することができるような先窄まり形状に形成されている。つまり、この先窄まり形状というのは、後部11rの照射光Laをできるだけ外部に漏らすことなく中実内部で効率よく全反射させて出射面11uに導光できるような形状で、この例では円錐形状が用いられている。

【0015】第2集光手段12は、遮光筒13を挟んで第1集光手段11に内接するように設けられるもので、第1集光手段11と同様な構造の後部12r及び前部12fを有し、第1集光手段11と相似な形状とされているが、ただ前部12fの長さが第1集光手段11の前部11fより短くされている。

【0016】遮光筒13は、例えばアルミのような非透明性の素材を用いて第1集光手段11の内面形状に相似な薄い筒体に形成されている。そして、この遮光筒13は、その先端が僅かに第1集光手段11の出射面11uより突出して遮光用突出部15となる状態にして第1集光手段11に内接させられている。尚、図中16は、集光ガイド1を対物具2に接続させるための接続ホルダであり、17は、レンズホルダである。

【0017】この集光ガイド1は、遮光筒13の先端が観察物Mの表面に接する状態にして用いられるもので、この状態において光学系のピントが観察物Mに合うようになっている。またこの状態で、第1集光手段11の出射面11uは観察物Mの表面にほぼ接するような近接状態になる。したがって、出射面11uから出射した照射光Laは、対物レンズ3の視野、つまり観察部位Sには直接照射されることなく観察部位Sの周囲から観察物Mの表層内部に一旦透過し、それから観察物Mの表層内部で反射されて観察部位Sを内側から照らす透過光Ltとなる。

【0018】ここで、前記の所定の角度とは、照射光Laが観察部位Sの周囲から観察物Mの表層内部に透過した後反射された透過光Ltとして観察部位Sに至ることが可能な入射角のことである。

【0019】一方、第2集光手段12の場合は、その前部12fが第1集光手段11の前部11fより短いため、その出射面12uが観察物Mの表面から十分に離れている。したがって、その出射面12uから出射されて照射光Lbは、観察物Mの観察部位Sに直接落射する落射光Ldとなる。したがって、第1、第2の各集光手段11、12への光源5a、5bからの入射光の有無やその光量の比率を変えることにより、任意に透過光または落射光を選択でき、あるいは両光を適宜な比率で組み合わせることができる。

【0020】このような第1、第2の各集光手段11、

1 2の照射光選択機能に対し、遮光筒1 3は以下のような役目を負っている。一つは、何れも透明体で作られている第1、第2の両集光手段1 1、1 2を光学的に完全に分離し、一方の集光手段の光が他方の集光手段に入るのを防止することにより、透過光照明及び落射光照明それぞれをより純粋なものとするのである。また他の一つは、観察物Mの表面における照射光の漏れを防止することにより、透過光照明及び落射光照明それぞれの純化を図ることである。すなわち、観察物Mの表面においては、透過光L tの場合であれば観察部位Sの周囲から観察部位S側へ、また落射光L dの場合であれば観察部位Sからその周囲側へ、それぞれ漏れようとするが、この漏れをその突出部1 4で防止している。

【0 0 2 1】図4に示すのは、他の実施例で、この例の集光ガイド2 0は、第1集光手段2 1及び第2集光手段2 2それぞれの前部2 1 f、2 2 fが球面体状に形成されている。このような球面体形状は、導光の効率性という点で前記実施例における円錐形状より優れている。他方、円錐形状は、球面体形状の場合にはその製作に成型型を用いる成形加工を必要とするのに対し、切削加工が可能で加工性がよいという長所を持っている。尚、その他、前記実施例の集光ガイド1 と対応する部分には対応の符号を付し、その説明は省略している。

【0 0 2 2】以上の実施例では第1集光手段と第2集光手段とをほぼ相似形状に形成していたが、必ずしも第2集光手段が第1集光手段に対し相似である必要はない。要は第1集光手段の内側に設けられる第2集光手段の出射面から照射される照射光が観察部位に効率よく落射されるようになっていればよいということである。

【0 0 2 3】

【発明の効果】この発明による集光ガイドは、以上説明

したように、第1集光手段及び第2集光手段を組み合わせたり、第1集光手段により透過光が得られ、また第2集光手段により落射光が得られるようになってるので、これらを選択的に使用でき、より多面的な観察が可能となる。また、遮光筒を設けたことにより、透過光及び落射光のそれぞれをより純粋なものにでき、照射光の選択的使用の実を上げることができる。

【図面の簡単な説明】

【図1】一実施例による集光ガイドの断面図。

【図2】光源の構造及びこれと集光ガイドの関係を示す斜視図。

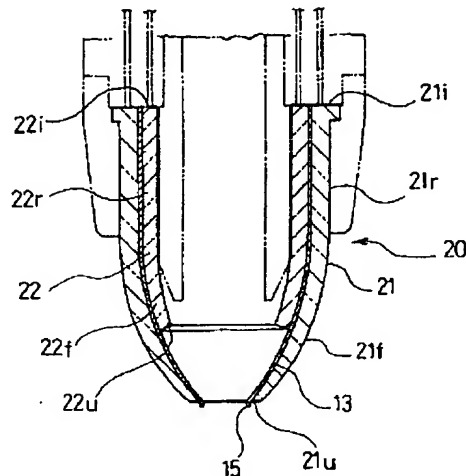
【図3】この発明による集光ガイドを取り付けた対物具の斜視図。

【図4】他の実施例による集光ガイドの断面図。

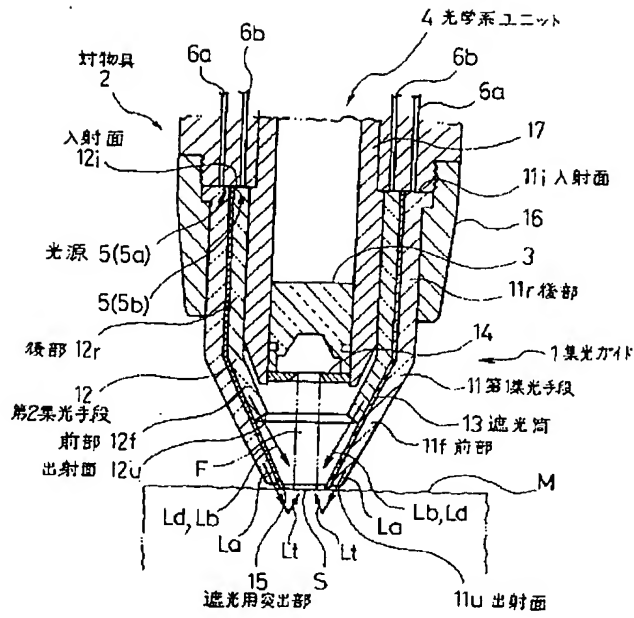
【符号の説明】

- 1 集光ガイド
- 2 対物具
- 5 光源
- 1 1 第1集光手段
- 1 1 r 後部
- 1 1 f 前部
- 1 1 i 入射面
- 1 1 u 出射面
- 1 2 第2集光手段
- 1 2 r 後部
- 1 2 f 前部
- 1 2 i 入射面
- 1 2 u 出射面
- 1 3 遮光筒
- 1 5 遮光用突出部

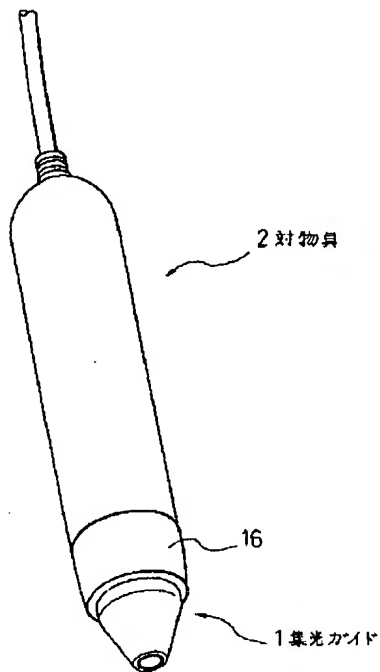
【図4】



【図 1】



【図 3】



【図 2】

